Name:

at1117paper: Complete the Square (v309)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 54 feet. Their combined area, found by adding the square's area and the rectangle's area, is 1771 square feet. What is the value of x?

Example's Solution

$$x^2 + 54x = 1771$$

To complete the square, add $\left(\frac{54}{2}\right)^2 = 729$ to both sides.

$$x^2 + 54x + 729 = 2500$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 27)^2 = 2500$$

Undo the squaring.

$$x + 27 = \pm\sqrt{2500}$$

$$x + 27 = \pm 50$$

Subtract 27 from both sides.

$$x = -27 \pm 50$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 23$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 52 feet. The total area, of the square and rectangle, is 1628 square feet. What is the value of x?

$$x^2 + 52x = 1628$$

$$x^2 + 52x + 676 = 2304$$

$$(x + 26)^2 = 2304$$

$$x + 26 = \pm 48$$

$$x = 22$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 1139 square feet. What is the value of x?

$$x^2 + 50x = 1139$$
$$x^2 + 50x + 625 = 1764$$
$$(x + 25)^2 = 1764$$
$$x + 25 = \pm 42$$
$$x = 17$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 50 feet. The total area, of the square and rectangle, is 600 square feet. What is the value of x?

$$x^2 + 50x = 600$$
$$x^2 + 50x + 625 = 1225$$
$$(x + 25)^2 = 1225$$
$$x + 25 = \pm 35$$
$$x = 10$$